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Energy Information Administration

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India

The Republic of India (India), the world's sixth largest energy consumer, plans major energy infrastructure investments to keep up with increasing demand--particularly for electric power and possible imports of liquefied natural gas to support power projects. India also is the world's third-largest producer of coal, and relies on coal for more than half of its total energy needs.

Note: information contained in this report is the best available as of July 2001 and can change.

BACKGROUND

The 1990s were a time of rapid economic change in India. After several decades of pursuing protectionist "import substitution" trade policies and placing severe limitations on foreign investment, India began to open up to foreign investment and trade. By the mid-1990s, India's real GDP growth rate had reached a rate of 7.4% (1995-96). Sanctions imposed as a result of the country's 1998 nuclear weapons tests, among other factors, helped slow India's real GDP growth to 4.6% in 1997-1998, but it recovered to 7.2% for 1999-2000 and 6.1% for 2000-2001. Real GDP growth is projected at aound 6% over the next several years. (The Indian fiscal year for economic statistics begins on April 1.)

In October 1998, after both India and Pakistan had declared moratoriums on nuclear testing, the U.S. Congress passed a bill providing the President the authority to waive some of the sanctions measures imposed against these countries for a period of one year. Sanctions had been imposed following the two countries nuclear weapons tests in

May 1998. In November 1998, the most significant sanctions dealing with the Overseas Private Investment Corporation (OPIC) and Eximbank activities, as well as mandatory U.S. opposition to further loans to India from international financial institutions, were suspended. Some sanctions were maintained, however, covering sales of 'dual-use' items with potential military applications, and any transactions with firms and government bodies which are involved with India's nuclear weapons program. In October 1999, President Clinton acted to extend the waiver of sanctions, and expanded the waiver to include U.S. bank lending to the Indian government.

India and the United States reached agreement in January 2000 on the removal of 1,400 specific trade barriers to open India to increased U.S. exports. Two of the largest export sectors for the United States to India are oil and gas equipment and electricity generating equipment.

India has implemented policy changes to encourage foreign investment. Tariffs on imported capital goods have been lowered, and in some cases eliminated (such as equipment for large scale power generation projects). Restrictions on foreign ownership have been relaxed. Previously, foreign ownership usually had been limited to a minority ownership stake. Now, in many sectors, majority foreign ownership is permitted. In some areas, however, reform has been slow - particularly the energy sector. Petroleum products and electricity consumption are still supported with subsidies, and the planned privatization of state-owned oil industry assets has seen numerous delays.

India's single largest foreign-invested corporate entity, the Enron-backed Dabhol Power Corporation (DPC), has become the focus of intense interest in 2001, as it has grappled with payment problems and contract disputes with its sole customer, the Maharashtra State Electricity Board (MSEB). DPC formally notified MSEB in April 2001 that it considered MSEB in breach of its power purchase agreement. The parties are still negotiating, but many analysts see this case as having the potential to significantly undermine foreign investor confidence in India.

For the first time in two years, the leaders of India and Pakistan held a summit meeting in mid-July 2001. President Musharraf and Prime Minister Vajpayee reportedly failed to reach agreement on a joint statement on the issue of Kashmir, which caused ongoing tension between the two countries since the partition of British India in 1947. The conflict is important to the energy sector in India, since it presents an obstacle to potential transportation corridors for gas and oil from Iran and Central Asia.

OIL

Oil accounts for about 30% of India's total energy consumption. The majority of India's roughly 4.7 billion barrels in oil reserves are located in the Bombay High, Upper Assam, Cambay, Krisha-Godavari, and Cauvery basins. The offshore Bombay High field is by far India's largest producing field, with production of 210,000 barrels per day (bbl/d) in 1999. India's average crude oil production level for the first four months of 2001 was estimated at 652,000 bbl/d. India imported over 1.2 million bbl/d in 2000.

Future oil consumption in India is expected to grow rapidly, to 3.4 million bbl/d by 2010 from 1.9 million bbl/d in 1999. India is attempting to limit its dependence on oil imports somewhat by expanding

domestic exploration and production. To this end, the Indian government is pursuing the New Exploration Licensing Policy (NELP), announced in 1997, which permits foreign involvement in exploration, an activity long restricted to Indian state-owned firms. While the initial response to the 1999 tender was disappointing, with no bids received from the major multinational oil companies (causing an extension of the deadline for submission of bids), India proceeded with the award of 25 oil exploration blocks in early January 2000. The largest winner in the bidding round was India's domestic Reliance Industries, in partnership with independent Niko Resources of Canada, which received 12 blocks. British independent Cairn Energy, Russia's Gazprom, the U.S. firm Mosbacher Energy, and Geopetrol of France were all awarded single blocks in partnership with Indian firms. India's state-owned Oil and Natural Gas Corporation (ONGC) was awarded eight blocks, three of which it will hold in partnership with other public-sector Indian firms. A second round of bidding, with a total of 25 blocks offered, concluded in March 2001. Sixteen of the blocks have been awarded to ONGC, and four blocks to Hardy Oil of the United Kingdom, in partnership with India's Reliance Petroleum. The others were either awarded to smaller independent firms or failed to receive bids. As with the first round, no bids were received from major international oil companies. A third round of bidding is planned in the near future.

Low drilling recovery rates are a major part of the oil supply problem for India. Recovery rates average only around 30% in currently producing Indian fields, well below the world average. It is hoped that allowing foreign investment will bring in technology that is not available to Indian state firms, thereby increasing overall recovery rates. ONGC currently is undertaking a project to increase recovery rates in the Bombay High offshore field, which will involve the drilling of 140 new wells. This is expected to increase the recovery rate from 26% to 32%. Recent experience does not support an optimistic view about India's prospects for s sharp increase in oil production as no major new finds have been made in recent years. Analysts consider it likely that most of India's easily recoverable oil has been discovered. The main cause for hope is offshore exploration, and in particular deep water exploration. One onshore area which also has shown promise is western Rajasthan, and a small find was reported in early 2001 by Cairn Energy offshore from Gujarat.

Downstream/Refining

In the past decade, India has imported a large quantity of refined products, lacking the refining capacity to keep up with growing demand. In 1999, refinery construction allowed India to close the gap. At the end of 2000, India had a total of 2.1 million bbl/d in refining capacity, an increase of 970,000 bbl/d since 1998. In late summer 1999, Reliance Petroleum's huge Jamnagar refinery came onstream. It has since reached its full capacity of 540,000 bbl/d. Jamnagar does not have its own retail distribution network, but sells its product through three of the state-owned firms. It plans to build a retail network of its own in coming years. Construction of the 210,000-bbl/d Essar unit (also at Jamnagar) is underway. Refinery construction has been encouraged by regulatory changes by the Indian government, including a five-year tax holiday for refineries completed by 2003, and a provision allowing foreign firms which invest more than $400 million in refinery infrastructure to sell refined products in competition with Indian state firms.

Another major downstream infrastructure development is the construction of pipelines being undertaken by Petronet India, a company created by an agreement in 1998 between India's state-owned refineries, which will add 500,000 bbl/d to India's current 325,000 bbl/d capacity for pipeline transportation of

refined products. Pipelines between refineries and major urban centers will replace rail as the main mode of transportation.

While retail gasoline sales are still controlled by state firms, several multinationals have entered the Indian lubricants market, which was deregulated five years ago. Over one-third of the market is currently held by such firms as Shell, Exxon, and Caltex. While these operations are relatively small, they are seen as allowing the majors to study the Indian market, establish brand recognition, and prepare for the eventual deregulation of the Indian retail petroleum products sector.

Industry Restructuring and Price Deregulation

In a restructuring of the state-owned oil sector, two of the main firms, India Oil Corporation (IOC) and Oil and Natural Gas Corporation (ONGC), formed a strategic alliance in early 1999 and swapped 10% of their respective shares. As ONGC is an upstream producer and IOC is a downstream refining and distribution firm, the stated aim of the alliance is to create an entity which can compete with the major multinational oil firms. Independent Indian analysts, however, have pointed out that the main effect of the transaction was to transfer $1.2 billion from IOC and ONGC to the Indian state treasury, because they were buying each others' shares from the government.

The Indian government plans to deregulate petroleum product prices in April 2002 and phase out the Oil Pool Account and the Administered Pricing Mechanism (APM), which subsidize consumption in an attempt to smooth out price fluctuations. An Oil and Gas Regulatory Authority is to be established to oversee the industry and ensure price competition. The phaseout of the APM will be problematic because it has run up a large deficit the last two years (over $3 billion) as a result of higher-than-projected prices for imported crude oil, which will need to be made up out of government funds. India's government also is considering the creation of a strategic petroleum reserve, but has not yet finalized a plan for one.

NATURAL GAS

Indian consumption of natural gas has risen faster than any other fuel in recent years. From only 0.6 trillion cubic feet (Tcf) per year in 1995, natural gas use was nearly 0.8 Tcf in 1999 and is projected to reach 1.3 Tcf in 2005 and 1.8 Tcf in 2010. Increased use of natural gas in power generation is to account for most of the increase, as the Indian government is encouraging the construction of gas-fired electric power plants in coastal areas where they can be easily supplied with liquefied natural gas (LNG) by sea.

Given that domestic gas supply is not likely to keep pace with demand, India will have to import most of its gas requirements, either via pipeline or LNG tanker. While EIA's current forecast in the International Energy Ouloook 2001 predicts a robust 6.5% annual growth rate in gas consumption, this reflects a substantial downward revision from the previous forecast, which projected consumption of 2.7 Tcf per year by 2010. Problems with financing LNG import projects have dimmed some of the previous prospects for explosive growth in gas consumption in India, and helped to revive interest in pipeline import options. Financial problems in the power sector, the main consumer of gas, also have had a negative effect.

Almost 70% of India's natural gas reserves are found in the Bombay High basin and the state of Gujarat. Current projects include enhancing gas production at the Tapti fields and recovering previously flared gas at the Bombay High oilfield. ONGC also has reported recent finds of modest quantities of gas in southern India, and Cairn Energy's offshore Gujarat find reported in early 2001 may produce some gas when it is developed.

India is investing heavily in the infrastructure required to support increased use of natural gas. Gas Authority of India Limited (GAIL), a government-owned entity, is to undertake a doubling of capacity on its main North-South pipeline. GAIL plans a new distribution network in West Bengal. Shell has signed a memorandum of understanding with the state government of Uttar Pradesh in northern India for the development of a gas distribution infrastructure.

India's Foreign Investment Promotion Board (FIPB) has approved 12 prospective LNG import terminal projects, but it was never considered likely that all would be built in the near future, as their combined capacity would have exceeded even the most optimistic demand projections. The Indian govenment has now frozen approvals of new LNG terminals, and the payment problems at Enron's Dabhol Power Plant in Maharashtra have led many to question the financial viability of some of the LNG import projects. Since the main consumers of the imported gas would be power producers, the poor financial condition of most of the state power boards which purchase power and run the transmission grids is likely to be a major constraint on gas-sector investment.

The largest state sector projects are to be conducted by Petronet, a joint venture between ONGC, IOC, the Gas Authority of India Ltd. (GAIL), the National Thermal Power Corporation (NTPC), and Gaz de France. Under the current plan, each of the state firms would own a 10% stake, the Gujarat state government will own a 5% stake, and the rest will be offered to private investors, possibly including an equity stake for Qatar's RasGas, the main supplier of LNG for the project. Petronet plans two import terminals, one at Dahej and the other at Cochin. RasGas is to begin supplying LNG to Petronet beginning in late 2003. The consortium hopes to resolve financial issues which have delayed implementation of the project and reach financial closure by the end of 2001.

In the wake of the problems with Dabhol, firms backing several other LNG projects have pulled out. BG announced in June 2001 that it was terminating its planned Pipavav LNG project in Gujarat. Dhaksin Bharat Energy, a consortium including CMS Energy and Unocal, also announced the cancellation of its planned LNG project at Ennore. Both of these LNG projects were cancelled largely in response to the Indian government's decision not to extend sovereign payment guarantees to power projects which were to have been among their largest customers.

TotalFinaElf of France, in a joint venture with Tata Electric and GAIL, is still planning a facility at Trombay, which will supply gas to a power plant and other users in Maharashstra. Shell has received approval from an LNG import terminal at Hazira in Gujarat, and has contracted for LNG supplies from Oman. Reliance Industries also plans an LNG import terminal at Jamnagar in Gujarat, near its oil refinery. None of these projects is yet under construction.

Aside from LNG imports, imports of gas by pipeline may play a role eventually in satisfying India's gas needs. One possibility would supply India with gas from Iran's huge South Pars field via a pipeline, either subsea or through Pakistan. Iran has discussed the proposal with India and Pakistan, and interest in the project has recently been revived, both by the presumed cost advantages over imports of LNG, and by the argument that the pipeline would help promote more cooperative relations between India and Pakistan. India agreed in June 2001 to a feasibility study for the route through Pakistan, which is to be completed by mid-2002. Australia's Broken Hill Proprietary (BHP) is the main foreign backer of the project. The offshore route is under study by Snamprogetti of Italy. Pakistan has said that it would allow supplies to cross its territory, and Iran would bear the contractual responsibility for assuring gas supplies to India. The idea of an Iran-India pipeline still faces major hurdles, since many in India remain convinced that imports through (or near) Pakistani territory are a major security risk, and the financial condition of the state power boards in India raise questions of financial risk for any major gas project.

Another possible import route would link the gas reserves of Bangladesh into the Indian gas grid. Current proven reserves of natural gas in Bangladesh are at least 11 Tcf, but the foreign firms involved in natural gas exploration in Bangladesh, which includes Unocal, believe that reserves are higher. Shell, which backs exports to India, has estimated Bangladeshi gas reserves at 38 Tcf. Bangladesh has been reluctant to approve exports to India, however, until all questions about reserves and its domestic supply have been resolved. Shell reportedly has been in negotiations with Unocal about possible imports of Bangladeshi gas for its distribution projects in Uttar Pradesh. Preliminary discussions also have been held between the Indian and Burmese governments about the possibility of gas imports from Burma into eastern India.

COAL

Coal is the dominant commercial fuel in India, satisfying more than half of India's energy demand. Power generation accounts for about 70% of India's coal consumption, followed by heavy industry. Consumption is projected in the International Energy Annual 2001 to increase to 427 million short tons (Mmst) in 2010, up from 348 million in 1999. India is the world's third largest coal producer (after the China and the United States), so most of the country's coal demand is satisfied by domestic supplies. Indian coal generally has a high ash content and low calorific value, so most coking coal must be imported. Major Indian coal fields are found in Bihar, West Bengal, and Madhya Pradesh.

The Indian government controls almost all coal production, which has been plagued by low productivity, distribution problems, and loss of markets to higher quality, less expensive imports. Nearly all of India's 390 mines are under Coal India Ltd. (CIL), which accounts for about 90% of the country's coal production. Current policy allows private mines only if they are "captive" operations which feed a power plant or factory.

ELECTRICITY

India is trying to expand electric power generation capacity, as current generation is seriously below peak demand. Although about 80% of the population has access to electricity, power outages are common, and the unreliability of electricity supplies is severe enough to constitute a constraint on the country's overall economic development. The government has targeted capacity increases of 47,000 megawatts (MW)

during the period covered by the current Five-Year Plan, between 1997 and 2002, and 111,500 MW by 2007. As of January 1999, total installed Indian power generating capacity was 103,445 MW, and it appears that the increase will fall far short of expectations during the plan period ending in 2002.

The drive to increase the country's generating capacity, along with the general trend toward economic liberalization in India in the 1990s, led to much interest among foreign investors in setting up Independent Power Producers (IPPs) in India. While dozens of projects were approved, most of the largest projects have been stalled by delays in regulatory approvals and in some cases failure to secure adequate financing. India's state electricity boards (SEB's), which run the power distribution infrastructure and own most current generating capacity, are in very poor financial shape, with many of them technically insolvent. One reason is the sale of power at subsidized rates, which does not cover costs (particularly in the agricultural sector). Other problems include the high level of transmission and distribution losses and widespread power theft. Since the SEBs would be the main purchasers of power from IPP projects, resolving their financial problems is critical to attracting the capital necessary to ensure the country an adequate supply of electric power.

While India currently does not have a unified national power grid, the country plans to link the SEB grids eventually, and has set up a state company, Powergrid, to oversee the unification. India also plans to establish national and state level regulatory bodies to set tariffs and promote competition.

In July 1998, the Indian government announced an easing of rules related to foreign investment in the power sector. Proposals for investments up to 15 billion rupees (about $350 million) involving up to 100% foreign equity now will be approved automatically. Automatic approval will be given for investments in generation or distribution from hydroelectric, coal, lignite, oil, or gas power plants, but not for nuclear plants and associated distribution networks. The earlier policy had allowed for only up to 74% foreign equity.

India's government is encouraging the construction of "mega-projects," defined as plants with capacity of more than 1,000 MW for thermal plants and more than 500 MW for hydroelectric plants, but approvals have not usually led to construction. The current status of "mega-projects" with approvals are:

- The 740-MW initial phase of the Dabhol LNG-fired power plant began operation in May 1999, and Phase II, which would add 1,440-MW of capacity, is reportedly about 90% complete. Payment problems with the Maharashtra State Electricity Board (MSEB), however, prompted Enron-backed Dabhol Power Corporation (DPC) to serve notice of breach of contract on MSEB in May 2001. Construction on Phase II has been halted.
- A 1040-MW coal-fired plant at Vishakapatnam was planned by Hinduja Power and National Power (UK). In June 2001, however, the Industrial Development Bank of India (IDBI) announced that it was withdrawing its loan to the project, throwing its future into doubt.
- Electricite de France has quit the coal-fired 1072-MW Bhadrawati project in Maharashtra state.
- The 1,886-MW LNG-fired unit at Ennore, with an associated LNG import terminal, was canceled by CMS Energy in June 2001.

- India's National Thermal Power Company was planning a 2,000-MW LNG-fired plant at Pipavav, but the project has been shelved after BG withdrew from the LNG import terminal project in June 2001.
- Powergrid was planning a 1,320-MW coal-fired plant planned for Cuddalore, which was delayed indefinitely in early 2001.
- Cogentrix cancelled the 1,000-MW Mangalore coal-fired project in December 1999.
- South Korea's Daewoo Power and ABB Lummus cancelled plans for a 1,400-MW plant in Madhya Pradesh in August 2000.

The Enron/DPC controversy is seen by many analysts as a test case for India's power sector. The Dabhol plant, valued at $2.9 billion, is the largest single foreign investment in India. While the company has begun termination proceedings, negotiations are continuing to try to find a solution. One idea reportedly under discussion would have the Power Trading Corporation (PTC), an Indian federal government-owned entity, become the primary purchaser of power from the plant, distributing some of it outside Maharashtra. Enron reportedly might also consider selling its stake in DPC to another firm.

The problems with DPC have drawn attention to the financial condition of the SEBs, which will need to be resolved in order to regain foreign investors' confidence. In the meantime, the Indian government has announced proposed legislation which will allow power plants to make direct sales to some of the largest industrial consumers, bypassing the SEBs. The ability to sell directly to creditworthy industrial customers could mitigate some of the risk associated with the SEBs. In the longer term, however, the central question is how to enable the SEBs to collect more revenues, or alternatively, to privatize electricity distribution, which many analysts see as the only way the problem can ultimately be resolved.

ENVIRONMENT

India, the world's second most populous nation, has seen its population explode from 300 million in 1947 to approximately one billion today. This rapidly growing population has placed a strain not only on India's infrastructure, but also on its environment. According to the World Health Organization, New Delhi is one of the top ten most polluted cities in the world. Two primary sources of air pollution in India are vehicular emissions and untreated industrial smoke.

Coal is a major commercial energy source in India. Increased coal consumption over the past four decades has led to a nine-fold increase in energy-related carbon emissions. Environmental effects due to the relatively high use of coal in the energy mix are exacerbated by the low energy efficiency of coal-based electricity generating plants. Inefficient plants are one of the contributing factors to a steadily increasing energy consumption per unit of output (ie. energy intensity). With the high costs associated with replacing existing coal-based plants, it is realistic to assume that these plants will continue running for the next couple of decades.

India's per capita energy use and carbon emissions, while lower than the world average, result in a substantial percentage of world energy use and carbon emissions, due to the country's large population and heavy reliance on coal. Increased use of renewable energy is one means of reducing carbon

emissions. Two major sources of renewable energy in India are wind power and hydroelectric plants. India's five year plan for 2002-2007 calls for 10% of new electric generating capacity to come from renewable sources.

India faces great challenges in energy and environment as it enters the 21st Century . A rapidly growing population will continue to increase demands for electricity generation and will place greater pressures on the environment to absorb increasing vehicular emissions.

Sources for this report include: Business Line; CIA World Factbook 2000; Dow Jones News Wire service; Economist Intelligence Unit; Financial Times; Hindustan Times; India Today; Oil and Gas Journal; Petroleum Economist; Petroleum Intelligence Weekly; Press Trust of India wire service; Times of India; The Statesman; U.S. Energy Information Administration; WEFA Asia Economic Outlook, World Gas Intelligence; World Bank India Economic Report.

COUNTRY OVERVIEW

President: Kircheril Raman Narayanan (since July 25, 1997)
Prime Minister: Atal Behari Vajpayee (since March 19, 1998)
Independence: August 15, 1947 (from the United Kingdom)
Population (2000E): 1.0 billion (2nd most populous country)
Location/Size: Southern Asia/3.3 million square kilometers 1.3 million square miles), one-third the size of the United States
Major Cities: New Delhi (capital), Mumbai (Bombay), Calcutta, Chennai (Madras), Hyderabad, Bangalore, Ahmedabad
Languages: Hindi, 17 other official languages, English
Ethnic Groups: Indo-Aryan (72%), Dravidian (25%), Mongoloid, other (3%)
Religions: Hindu (80%), Muslim (14%), Christian (2.4%), Sikh (2%), Buddhist (0.7%), Jains (0.5%), other (0.4%)
Defense (8/98): Army (980,000), Air Force (110,000), Navy (55,000), Jammu/Kashmir Border Security Force (185,000)

ECONOMIC OVERVIEW

Currency: Rupee
Exchange Rate (6/16/01): US$1 = 47.2 rupees
Gross Domestic Product (GDP, FY2001E): $508.2 billion
Real GDP Growth Rate (FY2001E): 6.5% **(FY2002E):** 5.2%
Inflation Rate (FY2001E): 6.7% **(FY2002E):** 7.0%
Current Account Balance (FY2001E): -$6.0 billion
Major Trading Partners: United States, Japan, United Kingdom, Germany, Russia
Merchandise Trade Balance (FY2001E): -$12.7 billion
Merchandise Exports (FY2001E): $48.8 billion
Merchandise Imports (FY2001E): $61.5 billion
Major Export Products: Gems and jewelry, engineering goods, clothing, cotton textiles, leather and

leather manufactures, iron ore, chemicals, software
Major Import Products: Petroleum and petroleum products, machinery, iron and steel, edible oils, chemicals, fertilizers
Monetary Reserves (2001, non-gold): $44.1 billion
External Debt (FY2001E): $108.2 billion
NOTE: FY (Fiscal Year) (FY 2001 April 1, 2001 to March 31, 2002)

ENERGY OVERVIEW

Energy-Related Ministries: *Coal*--Dilip Ray; *Petroleum and Natural Gas*--Ram Naik
Proven Oil Reserves (1/1/01): 4.7 billion barrels
Oil Production (first four months of 2001E): 652,000 barrels per day (bbl/d)
Oil Consumption (2001E): 1.9 million bbl/d
Net Oil Imports (2001E): 1.2 million bbl/d
Crude Oil Refining Capacity (1/1/01E): 2.1 million bbl/d
Natural Gas Reserves (1/1/01E): 22.8 trillion cubic feet (Tcf)
Natural Gas Production (1999E): 752 Bcf
Natural Gas Consumption (1999E): 752 Bcf
Recoverable Coal Reserves (12/31/96E): 82.4 billion short tons
Coal Production (1999E): 327 million short tons (Mmst)
Coal Consumption (1999E): 348 Mmst
Net Coal Imports (1999E): 19 Mmst
Electric Generation Capacity (1/1/99E): 104 gigawatts (GW), including 78 GW thermal, 22 GW hydro, 2 GW nuclear
Electricity Generation (1999E): 454 billion kilowatthours (79% conventional thermal; 18% hydro; 2% nuclear)

ENVIRONMENTAL OVERVIEW

Minister for Environment and Forest: T. R Baalu
Total Energy Consumption (1999E): 12.2 quadrillion Btu* (3.2% of world total energy consumption)
Energy-Related Carbon Emissions (1999E): 243.3 million metric tons of carbon (4.0% of world total carbon emissions)
Per Capita Energy Consumption (1999E): 12.3 million Btu (vs U.S. value of 355.8 million Btu)
Per Capita Carbon Emissions (1999E): 0.25 metric tons of carbon (vs U.S. value of 5.5 metric tons of carbon)
Energy Intensity (1999E): 25,308 Btu/ $1990 (vs U.S. value of 12,638 Btu/ $1990)**
Carbon Intensity (1999E): 0.51 metric tons of carbon/thousand $1990 (vs U.S. value of 0.19 metric tons/thousand $1990)**
Sectoral Share of Energy Consumption (1998E): Industrial (41.0%), Transportation (9.5%), Residential (47.3%), Commercial (2.2%)
Sectoral Share of Carbon Emissions (1998E): Industrial (67.3%), Transportation (15.6%), Residential (13.7%), Commercial (3.3%)
Fuel Share of Energy Consumption (1999E): Coal (51.5%), Oil (33.2%), Natural Gas (7.1%)
Fuel Share of Carbon Emissions (1999E): Coal (64.2%), Oil (30.1%), Natural Gas (5.7%)

Renewable Energy Consumption (1998E): 9,015 trillion Btu* (2% increase from 1997)
Number of People per Motor Vehicle (1998): 142.9 (vs U.S. value of 1.3)
Status in Climate Change Negotiations: Non-Annex I country under the United Nations Framework Convention on Climate Change (ratified November 1st, 1993). Not a signatory to the Kyoto Protocol.
Major Environmental Issues: Deforestation; soil erosion; overgrazing; desertification; air pollution from industrial effluents and vehicle emissions; water pollution from raw sewage and runoff of agricultural pesticides; tap water is not potable throughout the country; huge and rapidly growing population is overstraining natural resources.
Major International Environmental Agreements: A party to the Antarctic-Environmental Protocol, Antarctic Treaty, Biodiversity, Climate Change, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Nuclear Test Ban, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands and Whaling.

* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.
**GDP based on EIA International Energy Annual 1999

ENERGY INDUSTRY

Organization: *Petroleum* - Oil and Natural Gas Corporation (ONGC), Oil India Ltd. (OIL), Indian Oil Corporation (IOC); *Natural Gas* - Gas Authority of India Limited (GAIL); *Coal* - Coal India Limited (CIL)*; Electric Power* - National Thermal Power Corporation (NTPC), National Hydroelectric Power Corporation, State Electricity Boards
Major Oil Fields (1999 production): *Bombay Offshore*: Bombay High (210,250 bbl/d), B-38/Heera & S. Heera (51,110 bbl/d), Neelam (31,234 bbl/d); *Eastern*: Lakwa-Lakhmani (14,680 bbl/d); *Western*: Gandhar (38,666 bbl/d); *Southern*: Ravva (51,893 bbl/d)
Major Oil Terminals: Bombay, Cochin, Haldia, Kandla, Madras, Vizag
Major Oil Refineries (1/1/01 capacity): Reliance-Jamnagar , 540,000 bbl/d, Koyali-Gujarat, 185,100 bbl/d; Mangalore, 180,000 bbl/d, Mathura-Uttar Pradesh, 156,000 bbl/d; Mahul-Bombay (Bharat Petroleum), 120,000 bbl/d; Madras, 130,660 bbl/d, Mahul-Bombay (Hindustan Petroleum), 111,700 bbl/d
Major Pipelines: *Oil*--Salaya-New Delhi, Barauni-Digboi, Kandla-Bhatindu (products); *Natural Gas*--Hazira-Bijapur-Jagdishpur (HBJ)

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